TAP INTO Quality

DURHAM
1869
CITY OF MEDICINE

Department of Water Management

Dear Durham Water Customers,

Welcome to the 10th edition of our annual water quality report — "*Tap into Quality*." Many portions of this report are included to meet requirements set by the U.S Environmental Protection Agency (EPA). But we always like to expand the report beyond the required elements and include more information about how the water system operates as well as notify you about changes that may come about in the near future. This format also allows us to provide background information about "hot" topics during the year covered by the report.

As most of you know, a lot of attention during 2006 was focused on lead levels in some homes in Durham. There is NO lead in the water leaving either of Durham's two water treatment facilities and no lead has been detected in water flowing through our water distribution system. If lead is present, it is due to leaching from copper pipes joined by lead based solder in structures built before the ban on lead solder in December 1985. But there is much more to the story than what you may have already heard or read. Please refer to the article on lead on pages 6–7 of this brochure for the full story.

Our customers should know that the entire staff of the Department of Water Management is committed to providing safe drinking water to your homes and businesses, 24 hours a day, seven days a week. As part of this commitment to public health, staff reviews the latest technology and operational strategies, attends meetings, workshops, seminars and participates in on-site training to ensure those goals are met. Decisions on treatment changes are not made lightly and are evaluated based on the overall benefit to public health. An example of such a major change was the decision to switch disinfection methodologies in 2002.

In tracking EPA rulemaking, staff became aware in the late 1990s that levels of allowable disinfection by-products (DBPs) in the distribution system were going to be significantly lowered. Based on the recommendations of consulting engineers, the City changed from using chlorine for disinfection to using chloramines — a mixture of ammonia and chlorine. Raleigh and Cary had made this change earlier and our neighbors in Chatham County, Hillsborough and Orange Water & Sewer Authority all made the same decision in the same time frame as Durham. We were able to collaborate with them on a number of public education and information activities related to the switch. After the installation of new chemical feed equipment, both Durham and OWASA began feeding chloramines in late January 2002. Testing for the disinfection by-products in the distribution system showed that the decision was sound as levels throughout the system dropped and we have consistently remained in compliance with those water quality standards. [For more information on the DBPs, see the TTHM and HAA data in the substance table inside.]

Water providers are always walking a tightrope to carry out a delicate balancing act to produce water that is safe from biological pathogens as well as organic and inorganic contaminants. In Durham and other triangle cities, water professionals strive to meet numerous stringent state and EPA regulations. I hope that after reading this report, you will have a better understanding of the drinking water process and our commitment to protecting public health. Feel free to contact our staff if you have additional questions, concerns or comments.

Sincerely,

Terry Rolan, Director

QUESTIONS? Questions regarding the information in this report should be directed to Water Management staff at the Brown Water Treatment Plant, **560-4362**. For information on water conservation or to arrange a tour of facilities, call **560-4381**. Call **560-4411** for **all** billing questions. For information about City operations and services, contact **Durham One Call** at **560-1200**.

Only Tap Water Delivers℠

Durham's customer base continues to grow and by the end of 2006, the system was providing water to approximately 220,000 people. As the number of customers grows however, the average amount of water used per person continues to decrease. We attribute the decrease to water conservation messages and the installation of newer water efficient fixtures in new and renovated homes in the service area. Many commercial establishments and industrial users have also implemented water efficiency strategies that not only manage their demand but also decrease overall usage. In fact, even with population increases, the 2006 average daily demand (usage) on the water system was 27.25 million gallons per day (MGD) a very slight decrease from the previous year's 27.63. Thanks to wise water use and a temperate year with normal rainfall (approximately 46 inches per year), neither supply lake fell more than 5 feet below full during the entire year.

Tap Water Compliance History

In this 2006 edition of Tap into Quality, you will learn that while the City of Durham continues to comply with state and federal required water quality standards for drinking water, there were three notable incidences of exceedance or violation. During this calendar year, Durham received three reporting violations from the state's Department of Environment and Natural Resources (DENR). Two violations, issued together, were for failing to collect, analyze and submit results for Volatile Organic Compounds (VOCs) from each of the treatment plants. The City of Durham is required to monitor drinking water from both water treatment plants for the specific contaminants included in the VOC group annually. The results of annual monitoring are an indicator of whether or not drinking water meets health standards. During the compliance period covered by this report — January 1 through December 31, 2006 — we did not complete all monitoring or testing for the VOC compounds and therefore cannot be sure of the quality of our drinking water during that time. These compounds include some of the Total Trihalmethanes and Haloacetic Acids that were collected and tested quarterly. As staff researched the issue, it was determined that the samples were collected during the monitoring period; however, they were not submitted to the testing laboratory before the holding time expired. When this was discovered, staff immediately re-sampled both locations (in February '07) with results indicating full compliance with standards. The system has been returned to a "compliant" status.

The City also received a reporting violation for failing to submit results of lead and copper testing to the state within the specified time-frame. Staff was waiting for an interpretation from state staff on the eligibility of some sample results for inclusion in spreadsheet calculations. The results were submitted 13 days beyond the reporting period. Staff has initiated compliance and sample tracking measures to ensure that ALL samples are collected, analyzed and submitted to reporting authorities on time.

Durham water sources

The sources of drinking water — both tap and bottled — include rivers, lakes, streams, ponds, reservoirs, springs and wells. Durham is fortunate to have two high quality sources of raw (untreated) water. Lake Michie, built in 1926, reliably supplied approximately 19 million gallons per day (MGD) for over 80 years. Driven by rapid development in the mid 1980s, the City constructed the Little River Reservoir and Dam in 1988 to provide an additional 18 MGD of water, for a combined capacity (safe yield) of 37 MGD. In addition to having two water supplies, Durham also has two water treatment plants, the Williams Water Treatment Plant (located on Hillandale Road) and the Brown Water Treatment Plant (located on Infinity Road). Water can be transferred from the two supply lakes to the two treatment plants by gravity flow, hydropower or electric power. Terminal reservoirs at each of the water treatment plants hold about a two-to-three day supply of raw water. In 2002, the City of Durham obtained an allocation of 10 million gallons of water per day from Jordan Lake, another local high quality water source. Future plans call for building a raw water intake at Jordan Lake; however current access is via the Town of Cary's water system. The City also plans to use Hanson Aggregate's Durham Quarry (formerly Teer Quarry) for additional water storage.

Source Water Information Available

The North Carolina Department of Environment and Natural Resources (DENR), Public Water Supply (PWS) Section, Source Water Assessment Program (SWAP) conducted assessments for all drinking water sources across North Carolina. The purpose of the assessments was to determine the susceptibility of each drinking water source (well or surface water intake) to Potential Contaminant Sources (PCSs). The results of the assessment are available in SWAP Assessment Reports that include maps, background information and a relative susceptibility rating of Higher, Moderate or Lower. Since these reports are over 100 pages each, DENR requires only that water providers present the basic information from the report in each year's water quality report.

The relative susceptibility rating of each source for the City of Durham was determined by combining the contaminant rating (determined by the number and location of PCSs within the assessment area) and the inherent vulnerability rating (i.e., characteristics or existing conditions of the watershed and its delineated assessment area). The assessment findings are summarized in the table below:

SUSCEPTIBILITY OF SOURCES TO POTENTIAL CONTAMINANT SOURCES (PCSS)

SOURCE NAME	SOURCE NAME
Little River Reservoir	Lake Michie
SUSCEPTIBILITY RATING	**SUSCEPTIBILITY RATING**
Moderate	Moderate
SWAP REPORT DATE	**SWAP REPORT DATE**
March 18, 2005	March 18, 2005

The complete SWAP Assessment report for the City of Durham (PWSID# 03-32-010) may be viewed on the Web at: http://www.deh.enr.state.nc.us/pws/swap. Or you may order a printed copy of this report by written request to: Source Water Assessment Program — Report Request, 1634 Mail Service Center, Raleigh NC 27699-1634, or emailing a request to swap@ncmail.net. Please indicate the system name (City of Durham), PWSID (03-32-010), and provide your name, mailing address and phone number. If you have any questions about the SWAP report please contact the Source Water Assessment staff by phone at 919-715-2633.

It is important to understand that a susceptibility rating of "higher" does not imply poor water quality, only the systems' potential to become contaminated by PCSs in the assessment area. The City's "moderate" rating indicates a lesser potential for contamination.

WATER-SAVING DEVICE #79

Use a hose nozzle and turn off the water while you wash your car to save more than 100 gallons.

SUBSTANCE AND UNIT OF MEASUREMENT	MAX. LEVEL DETECTED AND RANGE	VIOLATION YES/NO	MAX. LEVEL ALLOWED (MCL)	IDEAL GOAL (MCGL)	POTENTIAL SOURCE(S) OF SUBSTANCE
Regulated at the Treatment Plants					
Barium mg/L	0.028 (<0.025 – 0.028)	NO	2.0	2.0	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Fluoride mg/L	1.0 (0.92 – 1.0)	NO	4.0	4.0	Naturally occurring mineral; also added to promote dental health
Nitrate mg/L (as Nitrogen)	0.36 (< 0.10 – 0.36)	NO	10.0	10.0	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Turbidity NTU	0.11 (<0.06 – 0.11)	NO	TT	N/A	Soil runoff
Turbidity, % of monthly samples ≤ 0.3 NTU	100%	NO	95%	100%	
Alpha emitters pCi/L Samples were collected and analyzed October 2003. Next sample date October 2008.	None detected no range	NO	15	0	Erosion of natural deposits
Beta/photon emitters pCi/L Samples were collected and analyzed October 2003. Next sample date October 2008.	None detected no range	NO	50	0	Decay of natural and man-made deposits
Regulated in the Distribution System					
Chloramines mg/L (as Cl_2)	2.6 RAA Running Annual Average	NO	MRDL 4.0	MRDLG 4.0	Water additive to control microbes
Chlorine mg/L	2.4 RAA	NO	MRDL 4.0	MRDLG 4.0	Disinfectant to control microbes; used only in March of each year during system burnout
Total Coliform Bacteria (as a percent)	0% positive	NO	< 5% positive	0% positive	Naturally present in the environment
Five Haloacetic Acids (5HAA) µg/L	46.6 - System Average (25 – 79)	NO	60	0	By-product of drinking water disinfection
Total Trihalomethanes (TTHM) µg/L	67.5 - System Average (31 – 117)	NO	80	0	By-product of drinking water disinfection
Unregulated Substances					
Chlorodibromomethane µg/L	1.0 (< 1.0 – 1.0)	NO	NR	NR	Component of TTHMs
Chloroform µg/L	107 (25 – 107)	NO	NR	NR	Component of TTHMs
Bromodichloromethane µg/L	13.0 (5.0 – 13)	NO	NR	NR	Component of TTHMs
Dichloro-acetic Acid µg/L	38.0 (11 – 38)	NO	NR	N/A	Component of 5HAAs
Trichloro-acetic Acid µg/L	42.0 (14 – 42)	NO	NR	N/A	Component of 5HAAs
Sodium mg/L	26.3 (19.8 – 26.3)	NO	NR	20 DWEL	Naturally occurring element in soil and water
Sulfate mg/L	30 (16 – 30)	NO	NR	250	Naturally occurring mineral in soil
Total Organic Carbon (TOC) mg/L Results show the range of TOC in both source and treated water. Durham's processes remove more than the required 50%.	Average Removal 58% Source 10.3 (1.9 – 10.3) Treated 4.1 (2.0 – 4.1)	NO	NR	TT 50% removal	Naturally present in the environment

The City of Durham (PWSID # 03-32-010) routinely monitors for over 150 contaminants in your drinking water according to Federal and State laws. The table below lists all the drinking water contaminants that were detected during **testing conducted from January 1 through December 31, 2006**. The EPA or the State requires water providers to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, while representative of the water quality, is more than one year old.

KEY TO ABBREVIATIONS IN TABLE:

mg/L	milligrams per liter, or parts per million
MCL	Maximum Contaminant Level; the highest level of a contaminant that is allowed in drinking water
MCLG	Maximum Contaminant Level Goal; the level of a contaminant in drinking water below which there is no known or expected risk to health
MRDL	Maximum Residual Disinfectant Level; the highest level of a disinfectant allowed in drinking water
MRDLG	Maximum Residual Disinfectant Level Goal; the level of a drinking water disinfectant below which there is no known or expected risk to health
AL	Action Level; the concentration of a contaminant, which if exceeded, triggers treatment or other requirements that a water system must follow. Action Levels are reported at the 90th percentile for homes at greatest risk
TT	Treatment Technique; a required process intended to reduce the level of a contaminant in drinking water
µg/L	micrograms per liter, or parts per billion
pCi/L	Picocuries per liter is a measure of the radioactivity in water
NTU	Nephelometric Turbidity Units; measures the clarity or cloudiness in water
NA	Not Applicable
ND	Not Detected
NR	Not Regulated
<	Less Than
DWEL	North Carolina guidance Drinking Water Equivalent Level

Special Note: *MCLs are set at very stringent levels. To understand the possible health effects described for many regulated constituents, a person would have to drink 2 liters of water every day at the MCL lever for a lifetime to have a one-in-a-million chance of having the described health effect.*

PHYSICAL AND MINERAL CHARACTERISTICS

SUBSTANCE, UNIT OF MEASUREMENT	ANNUAL AVERAGE
pH, standard units - range	7.2 – 8.2
Alkalinity, mg/L	23
Calcium, mg/L	4.6
Chloride, mg/L	18.4
Conductivity, micromhos/cm	171
Hardness - Calculated, mg/L	20
Hardness - EDTA, mg/L	23
Orthophosphate, mg/L (as phosphorus)	0.49
Potassium, mg/L	2.1
Total Solids, mg/L	108
Zinc, mg/L	0.41

Special Concerns

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial organisms are available from the Safe Drinking Water Hotline at 800-426-4791.

What is *Cryptosporidium*?

Cryptosporidium (*Crypto*) is a microbial parasite which occurs naturally in rivers and lakes throughout the United States and comes from animal wastes. Controlling and minimizing development and animal activities in our watershed reduces the occurrence of *Crypto* in raw water. This microscopic organism, while a concern for water providers, is typically very effectively removed by the water treatment process combination of filtration, sedimentation and disinfection. However, when ingested, *Crypto* can cause fever, diarrhea, and other gastrointestinal symptoms. As part of the EPA's Information Collection Rule, Durham monitored both supply lakes for *Crypto*. In the fall of 2006, Durham began monthly monitoring for *Crypto* at each water supply lake to ensure the continuing safety of the raw water, as well as to comply with the EPA Long Term Two Enhanced Surface Water Treatment Rule (LT2ESWTR). The results of the monitoring will determine whether or not additional treatment is needed to remove these parasites from the drinking water. *Crypto* has not been detected in previous monitoring events.

Community Participation

How can you be involved in decisions regarding Durham's water system or other City issues? Citizens are welcome to attend regularly scheduled meetings of Durham's City Council. Council meetings are held the first and third Monday of each month at 7 p.m. City Council members also have regular work sessions to prepare for Council meetings on Thursdays — two weeks prior to each regular Council meeting. Work sessions are held at 1 p.m. in the Council's Committee Room on the second floor of City Hall. Council meetings are held at City Hall in the Council Chambers on the first floor. Check the City's Web site to confirm meetings at www.durhamnc.gov. City Hall is located in downtown Durham at 101 City Hall Plaza.

How is Durham's water treated?

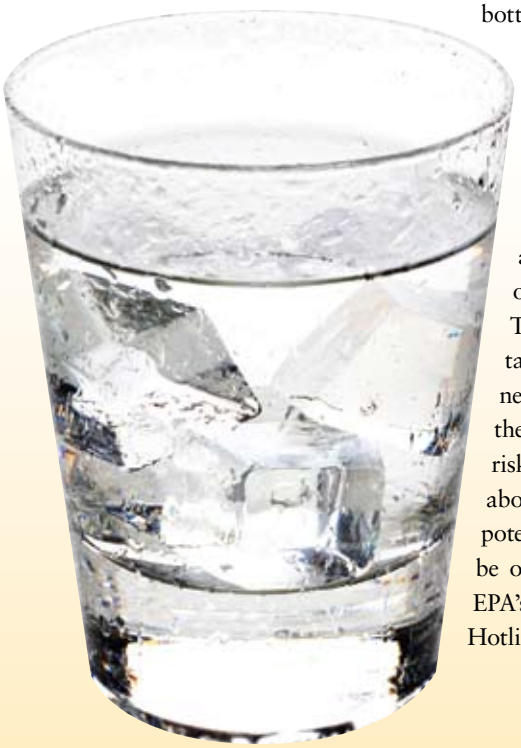
Both the Williams Water Treatment Plant (built in 1927, current capacity of 22 MGD) and the Brown Water Treatment Plant (built in 1977, current capacity of 30 MGD) operate using optimized conventional water treatment processes. At the water treatment facilities, raw water is mixed with caustic to adjust the pH and aluminum sulfate (alum) and/or ferric chloride to coagulate particles. After mixing, the water flows into settling basins where the particles stick together (coagulation), become heavy, and settle to the bottom of the basins (flocculation). After disinfection through chloramination, the clearer water flows through filters, removing the remaining particles. Fluoride is then added prior to distribution to our customers.

How does water travel?

As water travels over the surface of the land or through the ground, minerals and other materials are dissolved naturally. Water can also pick up substances that are the result of animal or human activity. Source water may contain microbial contaminants, such as viruses and bacteria; inorganic contaminants such as salts and metals; pesticides and herbicides from agriculture or urban run-off; organic chemicals from industrial processes or run-off; and radioactive contaminants which can be naturally occurring.

What can you expect of your drinking water?

In order to ensure that tap water is safe to drink, the EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration establishes regulations for contaminants in bottled water that must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at 800-426-4791.



Update on

Local and national news has raised awareness of lead levels in tap water. We would like to reassure the City of Durham's water customers that on-going sampling demonstrates that there is NO lead in the water leaving either of the City's two treatment plants or in the distribution system that supplies water to customers. The City of Durham conducted Lead and Copper Rule (LCR) testing one year early (September 2006); the next required triennial testing was scheduled for September 2007. Staff also conducted special sampling to optimize the corrosion control program by identifying homes from the existing sampling pool that experienced changes in the LCR lead levels from 2001 to 2004. Of the 10 identified sites, 8 customers participated in collecting as many as 21 special samples during the two month optimization study. During July and August, staff made several changes in dosages of chemicals used in the treatment process; all changes were within the Water Quality Parameters approved by the state Public Water Supply Section. The changes included:

- Switching treatment process coagulant from ferric chloride to aluminum sulfate (alum) at the Brown Water Treatment Plant.
- Decreasing the pH from a range of 8.2 - 8.4 to 8.0 - 8.2, and again to 7.8 – 8.0.
- Increasing the dosage of the long-standing corrosion inhibitor, zinc orthophosphate, from 0.3 mg/L to 0.6 mg/L, and again to 1.0 mg/L.

At the study's conclusion, staff initiated the routine compliance testing, soliciting participation from 142 sites across Durham. By the end of September, 69 customers had collected samples for analysis (surpassing the required 50). Those results were submitted to the state and were consistent with previous testing the City had conducted as part of the LCR requirements.

Throughout 2006, the City had offered free lead testing for any Durham water customer. By the end of the year, more than 800 customer-requested tests from geographically and age diverse homes had been processed and reported. In January 2007, state staff directed Durham to resubmit the LCR test results and include all test results collected between June 1 and September 30, 2006 that met the Tier 1 criteria of the LCR rule. Based on the criteria, an additional 107 customer-requested samples were added to the 90th percentile calculation, including the results of the eight sites tested repeatedly during the optimization studies. The inclusion of the results from the special study in the overall results led to an exceedance of the 90th percentile level

Lead in Drinking Water

allowed for lead (15 µg/L). City staff disputed the inclusion of the special study samples since they were selected specifically because higher lead levels were expected at these sites.

Nevertheless, the City proceeded to fulfill the requirements of an exceedance by providing increased public education materials, continuing evaluation of the corrosion control program and sampling additional sites for two consecutive six-month periods. As of this writing, the City has sampled 157 state-approved sites that meet the Tier 1 criteria, with one site testing greater than the action level and four sites testing greater than the detection level. Similar results are expected when the second round of testing begins in July 2007. The department continues to offer free testing upon request to all water customers, yet it is important to consider the age and type of plumbing material used in a structure prior to a test request.

WATER-SAVING DEVICE #15

Use a broom instead of a hose to clean your driveway and sidewalk and save up to 80 gallons of water every time.

If your home was built before 1986, it may contain copper pipes with lead solder. Through Durham's efforts, lead solder was banned in NC in December 1985, six months before a national ban in June 1986. There are simple steps that residents can take to reduce exposure to lead leaching from plumbing:

- **Always run water from the tap until you feel a temperature change before using it for cooking or drinking whenever the water in the faucet has gone unused for more than six hours.**
- **Never use water from the hot water tap for cooking or drinking.**
- **Regularly remove and thoroughly rinse faucet strainers.**

For more information on lead in drinking water, visit the US Environmental Protection Agency Web site at www.epa.gov/safewater/lead/leadfacts.html or the City's Web site at www.durhamnc.gov. Results of all lead testing conducted by the City since January 2007 are posted.

SUBSTANCE AND UNIT OF MEASUREMENT	MAX. LEVEL DETECTED AND RANGE	EXCEEDANCE YES/NO	MAX. LEVEL ALLOWED (MCL)	IDEAL GOAL (MCLG)	POTENTIAL SOURCE(S) OF SUBSTANCE	REASON(S) FOR REGULATING SUBSTANCE
Regulated at the Customer's Tap						
Copper, mg/L	90th percentile		AL = 1.3	1.3	*Corrosion of household plumbing systems*	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's disease should consult their health care provider.
September 2006	0.055	NO			None of the 69 sampling sites collected in September exceeded the Action level	
June – September 2006	0.074	NO			None of the 96 sampling sites collected in the June – September timeframe exceeded the Action Level	
Lead, µg/L	90th percentile		AL = 15	0	*Corrosion of household plumbing systems*	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
September 2006	9	NO			4 out of 69 sampling sites collected in September exceeded the Action Level	
June – September 2006 (includes routine compliance sites, customer requests and special study/ optimization samples)	28	YES			26 out of 175 sample sites exceeded the AL	
June – September 2006 (same as above, without duplicate/ triplicate samples collected as a part of system optimization studies)	14.4	NO			15 out of 156 sample sites exceeded the AL	